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**AGRICULTURE'S ROLE IN THE ECONOMY**

**OF THE UNITED STATES**

John R. Groenewegen and Kenneth C. Clayt



# **STAFF REPORT**

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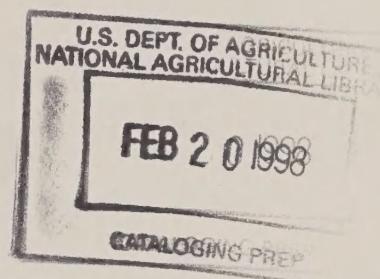
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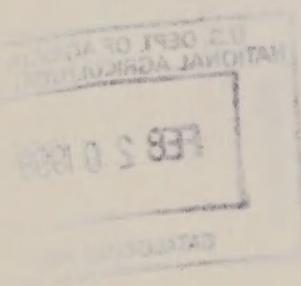
AGRICULTURE'S ROLE IN THE ECONOMY  
OF THE UNITED STATES

John R. Groenewegen and Kenneth C. Clayton



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## ABSTRACT

Agriculture has played a major role in the development of the U.S. economy. Substantial product flows occur between production agriculture and the rest of the food and fiber system. These interrelationships with the rest of the food and fiber system increase as more services are performed on the commodities that leave the farm gate and as more inputs are purchased. The value added to the flow of farm products as they move through the food and fiber system accounts for 20 percent of GNP and requires the services of 22 percent of the labor force. An increase in the final demand for food and fiber products has a considerable impact on the economy. One billion dollars of additional exports in 1979, for instance, would have generated nearly \$2 billion in economic activity and required the services of 35,000 workers in the food and fiber system.

Keywords: agriculture, productivity, economic growth, product flow, value added, employment, interrelationships, the economy.



## AGRICULTURE'S ROLE IN THE ECONOMY OF THE UNITED STATES

John R. Groenewegen and Kenneth C. Clayton \*

### Introduction

Agriculture has played a major role in the development of the U.S. economy. It continues to undergird our prosperity today. Through improved productivity in agriculture we have been able to move from a predominantly agrarian nation to one of the most highly industrialized nations. In 1929, there were 13 million farmers on 6.3 million farms in the United States. Today less than 4 million farmers on 2.3 million farms supply our food and fiber. Increased use of capital in place of labor has enabled us to progress from one farmer producing for 10 consumers in 1929 to one farmer producing for 60 domestic consumers today.

As the agricultural sector has developed and became more industrialized, the workers freed from the production of food and fiber have contributed to the growth of our overall economy. The efficiencies achieved in agriculture have lowered the proportion of income that consumers have had to spend for food. This has allowed consumers to increase their demand for non-food items, thereby increasing living standards and generating additional jobs in the non-farm economy.

The food and fiber system encompasses all of the activities involved in the transformation of basic resources into the food and fiber products consumed at home or abroad. The farm sector, or production agriculture,

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consumed at home or abroad. The farm sector, or production agriculture, transforms basic resources through biological processes, in combination with purchased inputs, into agricultural products. These products are further transformed through marketing and processing activities in the nonfarm economy into the food and fiber products demanded by consumers.

The food and fiber system involves many sectors of the economy in addition to production agriculture. Input suppliers, product handlers and transporters, processors, retailers, and eating establishments constitute part of the nonfarm portion of the food and fiber system. Also included in the system are the industries that indirectly contribute to the flow of farm products through the economy by providing input suppliers, processors, transporters, and the like, with the goods and services that they need. The manufacturing industry that supplies the containers in which food and fiber products are sold is one such example. Basic resource industries are also a part of the food and fiber system as they provide the necessary ore, coal and energy needed to produce the containers.

Currently, just under three percent of our Gross National Product (GNP) originates in production agriculture. This is down from seven percent before World War II, and reflects a declining relative share of consumer expenditures on food and fiber products. Nevertheless, the overall flow of agricultural products through the entire food and fiber system accounts for twenty percent of GNP. This contribution to our nation's economy arises out of the great many interdependencies that exist between agriculture and the rest of the economy. These relationships reflect in part a decline in certain activities within production agriculture and an increase in the processing of food and fiber products. In addition to related dollar purchases and expenditures, the flow of farm products necessitates the

services of nearly 23 million people, a full 22 percent of the labor force throughout the economy. The importance of agriculture thus relates particularly to its interrelationships with the rest of the economy -- the employment and economic activity that it generates throughout the food and fiber system.

This report describes the importance of the food and fiber system within the U.S. economy. Production agriculture's important productivity gains and its role in economic growth are outlined first. Next, an overview of the U.S. food and fiber system is provided through a description of product flow and resource requirements in the system. Finally, the contribution of the food and fiber system to the domestic economy is described in terms of GNP, income retained, and employment.

#### Agricultural Productivity and Economic Growth

The historical contribution of agriculture to the U.S. economy is somewhat different from its current role. The historical contribution is evidenced by employment trends in production agriculture, the contribution of agriculture to GNP, and consumer expenditures on agricultural products.

Since the 1920-30 period, consumer expenditures on food and beverages have declined from 28 percent of each consumer's total expenditures and 20 percent of GNP to 21 percent of each consumer's expenditures and 13 percent of GNP in 1979. The 13 percent of GNP does not include consumer expenditures on fibrous products and food and fiber exports, however, which if included would bring the total to nearly 20 percent of the GNP. As the share of consumers' expenditures on agricultural products has declined, the contribution of production agriculture to overall economic activity has fallen -- from 6.9 to less than 2.9 percent of the total value of goods and services in the economy.

Employment in production agriculture has declined substantially. Over 13 million farmers -- 26 percent of the labor force -- in 1929 provided the

populace with food and fiber. Only 3.8 million people -- 3.5 percent of the labor force -- on 2.3 million farms are currently involved. This corresponds to one farmer providing for 60 domestic consumers, while a single farmer could provide food for only 10 individuals 50 years ago.

The declining trends in farm employment and food expenditures stem largely from the high level of productivity, or efficiency, experienced in agriculture. Productivity growth in farming has outpaced that exhibited in the rest of the economy. Agricultural output has increased more than 70 percent since 1950, with input use remaining virtually unchanged.

Increases in agricultural output per unit of input have contributed to growth in the total domestic economy in two ways. First, productivity gains allow the same set of goods to be exchanged at a lower price, thereby lowering consumers' expenditures on food and allowing consumers to enhance their well-being by upgrading their diets and consuming more non-food items. Second, productivity in production agriculture has facilitated the transfer of workers out of agriculture into industrial and service activities. Employment in these latter activities has been encouraged by a broadening of consumers' demands as non-food budgets have grown.

Production agriculture continues to experience increases in efficiency, and these efficiency gains continue to outstrip those experienced in the non-farm economy. Production agriculture has also moved to an operating position that can be characterized as essentially one of equilibrium. That is, resources are not dramatically underemployed and their returns are comparable to returns earned elsewhere. If, in the future, domestic and foreign demand growth for food and fiber products exceeds productivity growth, additional resources may be drawn into production agriculture, as

well as the whole food and fiber system. This will expand the importance of the food and fiber system in the economy.

#### Product Flows Through The Food and Fiber System

As the U.S. economy has grown and matured, agriculture has been transformed, too. The increased use of purchased inputs in place of on-farm or non-purchased inputs has been perhaps the most noticeable change. Marketing services have also grown in complexity and importance. Specialization within production agriculture and throughout the food and fiber system has created linkages or interrelationships that make the food and fiber system so important to the U.S. economy.

The nature and extent of the linkages associated with the food and fiber system are detailed below. For purposes of exposition, the food and fiber system is categorized into the following : input suppliers, crop production, livestock production, marketing services, export markets, domestic consumers, and import demands. Figure 1 illustrates the product flows through the food and fiber system.

#### Input Suppliers

Production agriculture spent \$114.7 billion on inputs in 1979 (table 1). Of this amount, \$81.6 billion went for procurement of goods and services off the farm (figure 1). This latter expenditure represents an 89 percent increase between 1950 and 1979. The use of on-farm or non-purchased inputs declined by 44 percent over this same period.

The \$33.1 billion of inputs from production agriculture (excluding operator return) represents sales between farms and through intermediaries of feed, seed and livestock. This does not take into account the intra-farm transfer of inputs - e.g., grain transferred to livestock production on the same farm.

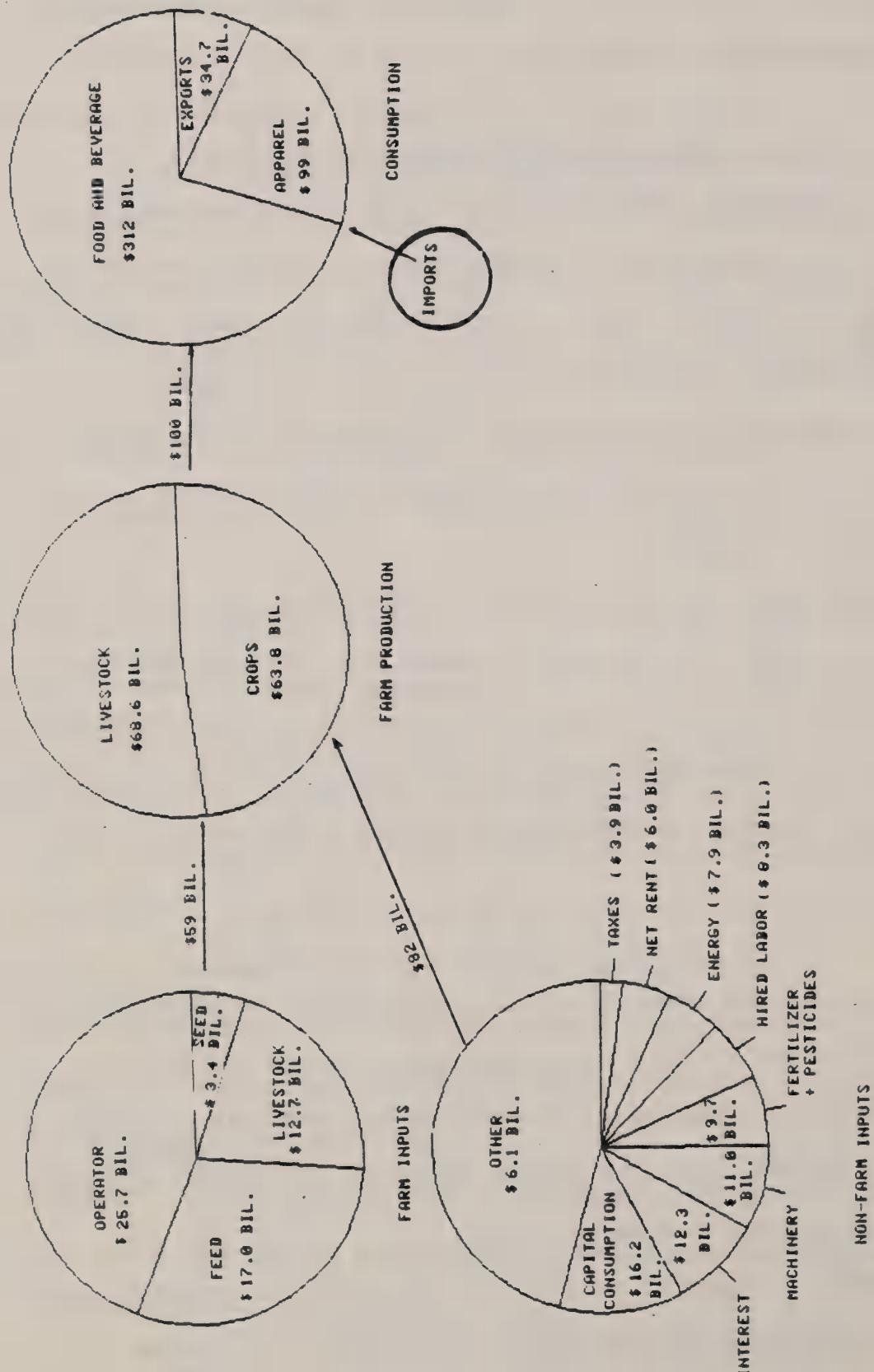


FIGURE 1. THE U.S. FOOD AND FIBER SYSTEM, 1979

With reference to the purchased inputs, production agriculture in 1979 spent \$7.9 billion on energy, nearly seven percent of total outlays. Operating expenses for machinery amounted to \$6.9 billion for repairs and operation, \$4.1 billion for custom and contract operations, and \$16.2 billion for depreciation of the existing capital stock. Labor services -- other than the operator -- cost \$8.3 billion. Interest on real estate debt and for operating loans was eleven percent of total production expenses, or \$12.3 billion in 1979.

Clearly, the financial health of production agriculture influences economic activity throughout the U.S. economy. At the same time, events in the larger economy also affect the viability of agriculture. The availability and cost of credit, for example, affect dramatically the viability of production agriculture. The demand for food and fiber in a more general sense is also affected by such factors as unemployment and inflation.

#### Crop Production

Three hundred and forty-eight million acres of cropland were harvested in 1979 providing for sales of \$64 billion (figure 1). Production from 116 million acres went into export channels with the remaining acreage being devoted to domestic needs. This amounted to 1.05 acres of cropland to feed each person in the United States in 1979. In contrast, 1.41 acres were required per person in 1960.

Feedgrains utilize the largest portion of our harvested cropland base - 102 million acres or 29 percent of all cropland. Foodgrains are responsible for another 75 million acres, soybeans 68 million acres and cotton 13 million acres (table 2).

Cash receipts of \$77.9 billion from crop marketings are projected for 1981 (figure 2). Corn and soybeans at the farmgate level will each be worth approximately \$15 billion. Wheat sales add \$9.9 billion to farmers'

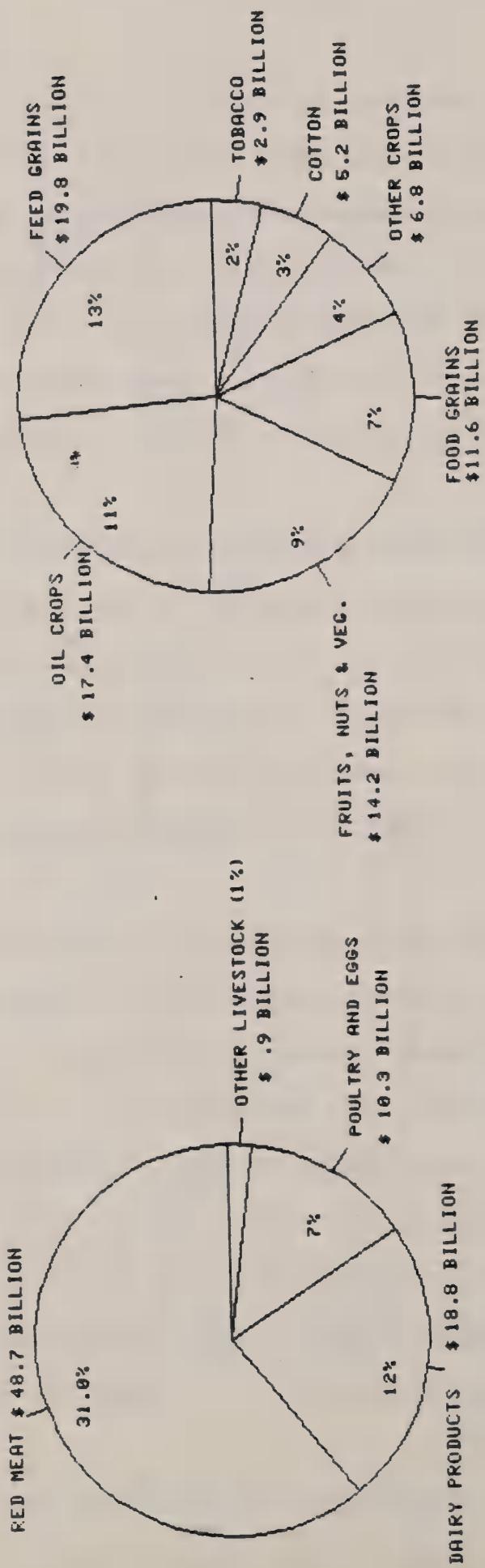


FIGURE 2. CASH RECEIPTS FROM FARM SALES, 1981 (PROJECTED)

NOTE: TOTAL SALES \$ 156.7 BILLION (LIVESTOCK \$ 78.8 BILLION, CROPS \$ 77.9 BILLION)

cash receipts. Cotton production will bring \$5.2 billion to farmers. Vegetables, fruits and nuts are extremely high-valued crops; their combined marketing receipts in 1981 should exceed \$14 billion--even though they are grown on a relatively small acreage base (table 3).

Certain crops serve as inputs into livestock production, such as feed-grains, soybeans, and hay. Not all grain production is used exclusively as livestock feed, however. Much of it is either exported, processed into food products or used in an industrial application. In the case of corn, the available supply in cropyear 1979/80 was equal to 9.24 billion bushels: 4.56 billion bushels were fed to livestock; 650 million bushels were used for food, seed and industrial uses; 2.43 billion bushels were exported; and, the remaining supplies were carried over by producers and processors into the subsequent crop year.

The multiple use of corn is typical of the situation in agriculture for crop production moving within the food and fiber system -- to livestock producers, to suppliers, to industrial users, to domestic consumers, and to export sales.

#### Livestock Production

Projections indicate that livestock producers will market \$78.8 billion of products in 1981 (figure 2). The production of livestock is greatly influenced by other developments in production agriculture. In 1979, for example, the livestock sector purchased \$13 billion of replacement livestock from other producers and consumed \$17 billion of feeding materials either directly from other producers or through feed mills which prepared feed rations. Livestock producers sold \$69 billion worth of products in that year (figure 1).

Cattle and calves are the highest value livestock product sold, with

projected sales of \$36.5 billion for 1981. Milk sales of \$18.3 billion rank second in value terms, although more pounds of milk are marketed per year than any other livestock product -- 123.6 billion pounds in 1979. Hog production will contribute \$11.7 billion to farm sales. The sale of poultry meats to processing plants will account for \$5.2 billion in farm marketing receipts. Egg production is substantial with 69 billion eggs being produced in 1979; farm marketings in 1981 will be worth \$3.3 billion (table 4).

#### Marketing Services

Nearly \$100 billion worth of commodities left the farm in 1979 and were marketed in various ways. The majority of farm products sold went into domestic consumption. The farm value of these products was \$80 billion, with nearly \$165 billion of marketing services added (table 5). Another \$20 billion of commodities went primarily into export channels where they generated \$34.7 billion in export earnings. A portion of the \$20 billion also resulted from industrial and apparel industry users.

To the \$80.6 billion worth of farm products moving to domestic consumers in 1979, \$164.5 billion of marketing services were added. The marketing bill for all foods was 67 percent of total consumer expenditures. The highest level of marketing services was provided for bakery products (\$23.4 billion), accounting for 86 percent of consumers' expenditures on these items. For beef, production agriculture and marketing services shared equally in consumers' expenditures, which were \$45.7 billion in 1979. Vegetables undergo considerable processing which accounts for 87 percent of consumers' expenditures on them. Eggs are the only product where production agriculture receives over half of total expenditures on the product. Production agriculture's 33 percent share of consumer expenditures for all

domestically produced foods has held relatively constant since the 1960's (table 5).

Labor is the largest beneficiary when agricultural products flow through the marketing system. Labor accounts for 46 percent of total marketing charges, or \$74 billion in 1979 (table 6). These are direct labor costs and do not reflect the indirect labor costs that result from hired transportation and distribution services, or the labor used to manufacture supplies, such as the packaging materials used by the food industry. The flow of farm products from the farmgate to consumers requires 7.1 million workers. The largest number (3.3 million workers) are employed in away-from-home eating establishments. Food stores employ 1.8 million people, while food processors employ 1.2 million, and food wholesalers employ .7 million people. These again are only the direct labor requirements; they do not reflect the considerable indirect labor services that are involved nor the labor employed by farm input suppliers.

The packaging of farm products accounts for 12 percent of marketing bill expenses--close to \$20 billion in 1979. Transportation absorbs 8 percent, or \$12.2 billion in 1979, of total marketing charges and promises to increase as energy prices increase. Fuel and energy expenses were \$10 billion, 6 percent of total marketing costs. Other expenses, which are 26 percent of total costs, include interest payments, rent, depreciation, and insurance. These totaled \$42.8 billion in 1979. The profit realized on marketing services in 1979 amounted to six percent of the total marketing bill.

The flow of agricultural commodities from the farmgate to the consumer's table thus requires that a number of processing and service activities be performed along the way. Each of these activities has a direct economic effect while also giving rise to indirect sales and employment effects.

### Export Markets

Agricultural exports are expected to reach \$47 billion in 1981 -- they stood at \$34.7 billion in 1979 (table 7 and figure 3). As a proportion of total exports, agricultural commodities have held fairly constant at around 20 percent for over the past thirty years. Grains and oilseeds are our most important exports. In 1979, they had a combined export value of \$22.9 billion--representing 66 percent of the value of exported agricultural products.

Agricultural exports constitute a major portion of our domestic production. In 1979, 64 percent of our wheat was exported totaling 40 percent of the total world trade in wheat. Feedgrain exports which earned \$7.7 billion of foreign exchange in 1979 constituted only 30 percent of domestic production, while accounting for 66 percent of world feedgrain trade. Similarly, soybeans and soybean product exports accounted for 39 percent of domestic production, but were worth \$8.9 billion and comprised 84 percent of world soybean exports (tables 7 and 8).

Since 1972/73, our agricultural trade surplus has increased sharply; it was \$18.8 billion in 1979 and is expected to increase further in 1981. Before 1972, our agricultural trade balance was essentially even. An agricultural trade surplus, such as the one we have experienced in recent years, results when the value of agricultural exports rises faster than imports, due mainly to quantity increases. Over the 1970-77 period, agricultural exports increased 67 percent in quantity terms while imports increased but 26 percent.

### Domestic Consumers

Americans enjoy one of the most bountiful and varied diets in the world, and at a relatively modest cost. Twenty-one percent of U.S. consumers' expenditures are devoted to food and beverage products -- approximately

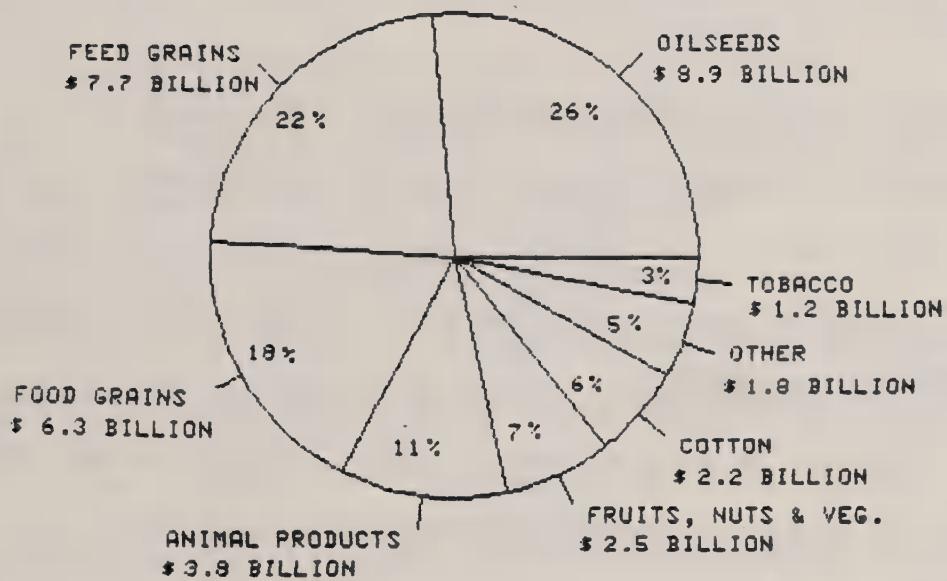


FIGURE 3. AGRICULTURAL EXPORTS, BY COMMODITY TYPE, 1979

NOTE: TOTAL AGRICULTURAL EXPORTS WERE \$34.7 BILLION

\$380 billion in 1981.<sup>1</sup> In 1979 the total was \$315 billion, including \$245 billion for domestically produced food. The difference, about \$70 billion, included fish, imported foods, and nonfood beverages.

In the decade of the 1970's, food price increases in the United States were moderate compared to other nations. Although U.S. food prices doubled during the decade, food prices worldwide increased by 2.5 to 3.0 times on average.

The typical American consumes just under 1,500 pounds of food per year (retail weight)--624 pounds of animal products and 839 pounds of crop products. In 1979, the average U.S. per capita consumption was 1,463 pounds of food. On average, 236 pounds of meat, around 380 pounds of fruits and vegetables, 345 pounds of dairy products, and 137 pounds of sugars and sweeteners were consumed (table 9). There can be little question that the U.S. food and fiber system provides for one of the most varied food diets in the world.

#### Import Demands

U.S. agriculture is not completely able to satisfy the tastes and preferences of all domestic consumers. Among other things, climatic conditions preclude the production of certain types of commodities. Around 50 percent of our \$17.6 billion agricultural import bill in 1979 consisted of such items as coffee, tea, bananas, fibers, and cocoa beans; commodities that cannot be produced in the United States. The remainder of the import bill is for items that substitute for similar items produced domestically. This latter situation allows a free choice of goods and services by consumers.

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<sup>1</sup> The inclusion of imports and some beverages, when food expenditures are computed as a percentage of income, causes this calculation to be 4-5 percent higher than is oftentimes reported.

It is also important for trade that the United States purchase goods from other countries so that they may have the foreign exchange earnings needed to make purchases from us.

#### The Food and Fiber System and the General Economy

The food and fiber system is linked to much of the rest of the economy. Economic activity and employment is therefore stimulated by an increased flow of food and fiber products into consumption. The nature and extent of these linkages and their implications are described below.

#### Gross National Product and the Food and Fiber System

Gross national product (GNP) is a commonly used statistic that measures the final output (sales) or final demand (purchases) for the flow of goods and services in the economy. By definition, sales and purchases must be equal.

On the demand or purchases side, GNP measures the value of all goods and services ultimately consumed in the economy and through net exports. It is classified into categories of personal consumption expenditures, domestic investment, net exports of goods and services, and government purchases of goods and services. Agricultural products show up primarily as the food and beverage component of personal expenditures and the agricultural portion of net exports. Final consumer demand and exports of agriculturally-related products (food, tobacco, clothing, shoes, cut flowers, seeds and potted plants) account for 20 percent of GNP. For 1981, this value will be approximately \$580 billion of the total \$2,900 billion projected GNP.

On the supply or sales side of the economy, GNP measures the contribution made by various activities in the economy in meeting the final demand for goods and services consumed in the economy. This contribution is measured as the "income retained" in a sector, or the "value added" by a sector to the

final product. For example, of the \$432.7 billion spent on agriculturally-related products in 1978, production agriculture contributed or retained 14 percent--that is, \$59.2 billion (table 10). The portion of consumer expenditures retained by production agriculture ranges from \$.11 per dollar of expenditure on canned, frozen and dehydrated food products to \$.56 per dollar of feedgrain exports (table 11). The form of final product consumed also affects the amount of consumer expenditures retained by crop producers, livestock producers, and various sectors in the non-farm economy (tables 12-15).

The nearly \$60 billion retained by production agriculture in 1978 was disbursed to hired labor, owner-operator labor and management, loan and mortgage companies, taxes, and depreciation. If production agriculture continues to retain 14 percent of total expenditures on agricultural products, nearly \$80 billion will be retained in 1981.

The nonfarm portion of the food and fiber system retained the rest, adding or contributing 86 percent of the total value (figure 4). Food processing retained 12 percent, resource and service activities retained 18 percent, manufacturing retained 19 percent, eating establishments 7 percent, and transportation, wholesaling, and retailing retained 30 percent of domestic and foreign consumer expenditures on agricultural products (table 10). The contribution by activities in the nonfarm economy varies by product demand (tables 12-15). Transportation, for example, retains 15 percent of consumer expenditures on canned and frozen products, and only 7 percent of the value of feedgrains moving into export positions.

#### Linkages of the Food and Fiber System with the General Economy

Product flows through the food and fiber system reflect contemporary agriculture's extensive interrelationships with the rest of the economy. These linkages have grown as more goods and services have come to be purchased

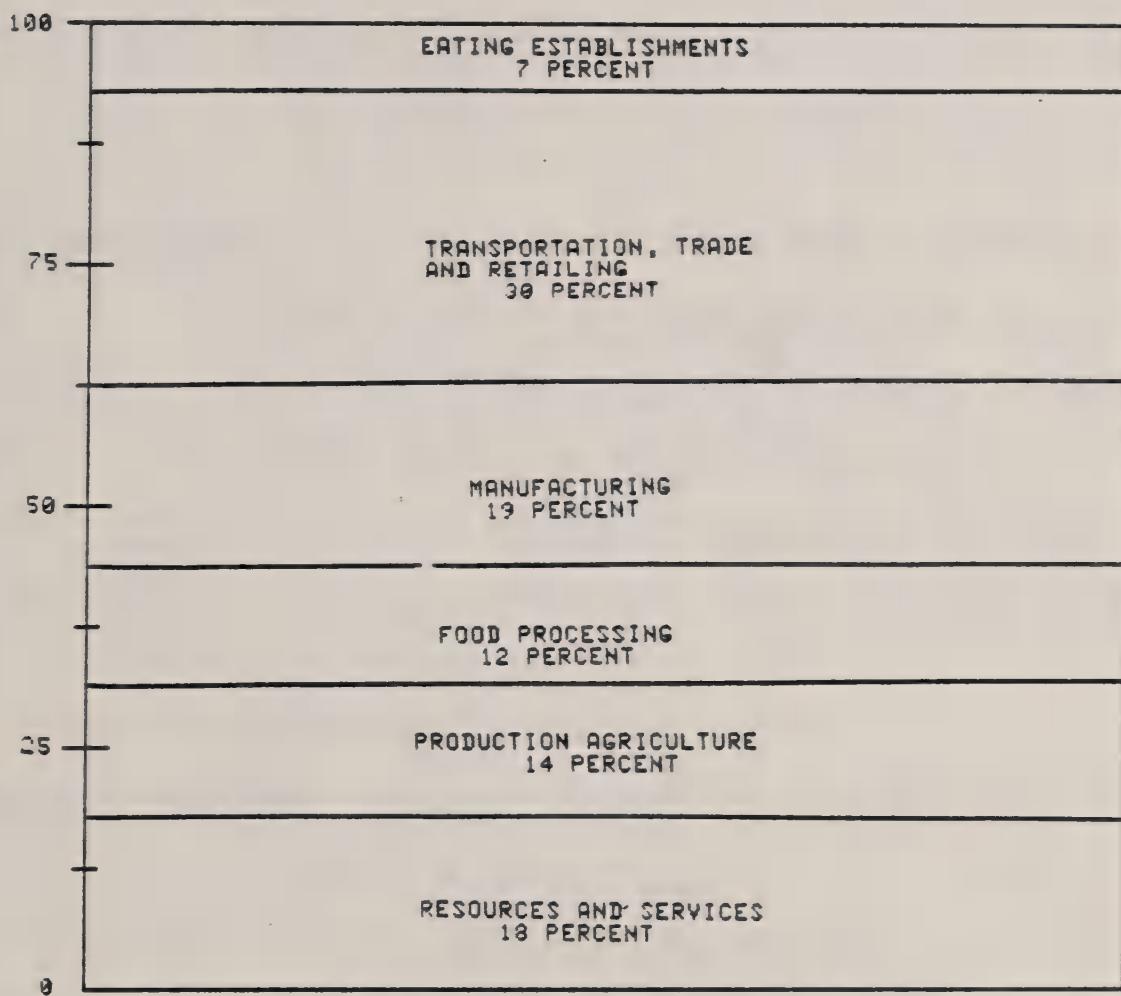


FIGURE 4. VALUE ADDED TO THE FLOW OF AGRICULTURAL PRODUCTS THROUGH THE ECONOMY, BY SELECTED ACTIVITIES, 1978

NOTE: TOTAL VALUE ADDED TO AGRICULTURAL PRODUCTS IS 20 PERCENT OF GROSS NATIONAL PRODUCT.

by production agriculture from the nonfarm economy and as additional marketing services have come to be performed on agricultural products as they flow through the economic system.

Any change in the flow of farm products through the food and fiber system greatly influences economic activity and employment in the general economy. In particular, a shift in the composition of consumer demand from relatively unprocessed goods to more highly processed goods will increase employment and stimulate the sales of more goods and services between firms in the economy.

A dollar increase in consumer or export demand for any agricultural product generates economic activity beyond that original dollar. Particularly, as more goods and services become imbedded in the food products purchased by consumers, the overall economy will expand to provide the necessarily wider array of related activities. Each dollar expended on a commodity is turned over that many more times -- oftentimes called the multiplier effect. As exports of grain increase, for example, additional resources are required by production agriculture and at other points in the food and fiber system -- e.g., machinery for planting and harvesting, fertilizer and chemicals to grow the grain, and trucks and barges to move the grain into export positions. These are direct impacts of the additional demand on the economy.

Economic activity is also generated indirectly to provide the added goods and services that are required to accommodate the increased flow of farm products through the economic system. For example, the trucks, barges, elevators, and handling facilities required to move grain to export positions are composed of steel, energy, labor services and other resources. These indirect impacts filter through the entire economy. For instance, labor services are required to mine the ore to make the steel to make the railcar to move the grain to export positions.

More highly processed commodities such as meat products have more linkages throughout the economy than do less processed commodities such as grain corn. As a result, more highly processed foods and end products generate more economic activity and employment than do commodities consumed in a less processed form, such as fresh vegetables or feedgrain exports, for example (table 11-15)

#### Employment and the Food and Fiber System

One of the contributors to the value added by each activity in the economy is labor. For the food and fiber system as a whole, just over 22 percent of the labor employed is in some way related to the activities in the system -- approximately 23 million workers in 1981 (figure 5). Based on 1978 employment patterns, production agriculture will require 3.4 million farmers in 1981 -- 15 percent of the total required for the food and fiber system.

The direct and indirect employment generated throughout the economy from food and fiber products involves 2.3 million workers in resource and service activities; 7.2 million in transportation and retail trade; 4.7 million in the manufacture of items required on the farm and at other points in the food and fiber system; 1.7 million in food processing; and 3.1 million in eating establishments (table 10).

As noted, the 23 million workers that are required to move agricultural products through the economy reflect both direct and indirect labor requirements. Direct labor requirements include, for example, the processing and packaging of meat products. Indirect labor requirements include the labor to produce the packaging materials, as well as to produce the equipment used to process the livestock products. These indirect labor requirements filter even further down through the economic system as labor services are

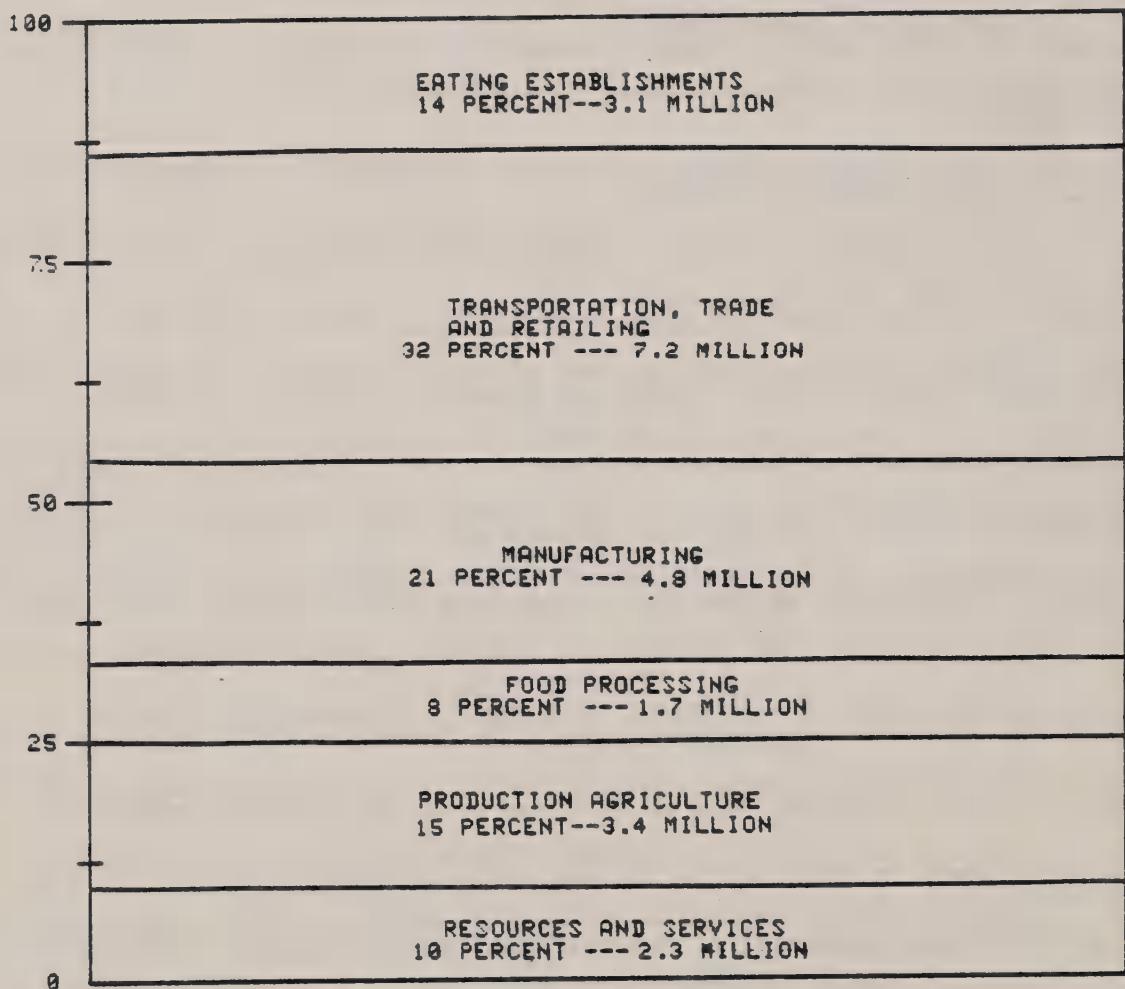


FIGURE 5. EMPLOYMENT GENERATED BY THE FLOW OF AGRICULTURAL PRODUCTS THROUGH THE ECONOMY, BY SELECTED ACTIVITIES, 1978.

NOTE: TOTAL EMPLOYMENT IS 22.3 PERCENT OF LABOR FORCE.

required to transform resources into the plants and equipment that produce the equipment for processing the livestock products.

The food and fiber system accounts for 20 percent of GNP and provides employment for 22 percent of the labor force. These statistics relate to expenditures on food and fiber products--not just production agriculture per se. Consequently, comparisons with other sectors or industries in the economy are not meaningful. For example, labor employed by the steel industry does not compare with the labor employed to provide food and fiber products for consumption. In fact, overlap exists as part of the labor used in the steel industry is considered part of the food and fiber system since steel is an input in the manufacture of the farm transportation and processing equipment used in the food and fiber system.

#### Contribution of the Food and Fiber System by Product Demand

In 1978, the flow of farm products into consumption channels generated \$156 billion in production agriculture, and \$765 billion in the nonfarm economy -- all to satisfy \$443 billion in final sales of agricultural products. Assuming similar conditions prevail, this could approach \$580 billion in 1981.

The impact of farmgate sales of food and fiber commodities on the rest of the economy depends on the ultimate use of the commodity. A bushel of grain going into export channels will generate less employment and business in the economy than a bushel that will be fed to cattle and ultimately processed into meat. The difference in employment and economic activity results from the latter product having more interrelationships with other activities in the economy. This can be illustrated by the employment and business generated by a one dollar sale of commodity to consumers or for export when the level of processing or the interrelationships with the rest of the economy varies. This impact can be shown for relatively

unprocessed products up to highly processed products -- from feedgrains, to poultry and eggs, to processed meats, up to canned, frozen, and dehydrated products (tables 11-15).

Increasing feedgrain exports by one dollar increases total business activity in the economy by \$1.90, with production agriculture receiving \$1.12. Livestock products such as poultry and eggs have a larger impact on business activity as more activities are involved. A dollar of final sales for poultry and eggs generates \$1.37 in production agriculture and \$1.57 of activity in the non-farm economy. Processed meat products give rise to even more economic activity as a \$1 sale would generate \$3.49 -- production agriculture receiving \$1.44. Higher processed products such as canned vegetables have more impact on the nonfarm economy with only \$0.23 of activity generated in production agriculture by a dollar of retail sales compared to \$2.19 in the non-farm economy (table 11).

The impact of production agriculture on the nonfarm components in the food and fiber system can be examined by calculating the amount of non-farm economic activity generated for each dollar of farmgate sales attributed to a specific final demand. As expected the more highly processed products provide more activity due to their greater sector linkages. Feedgrain exports give rise to \$.70 in the nonfarm economy for each dollar of farmgate sales. One dollar of producer cash receipts from poultry and egg sales generates \$1.14 of non-farm business, whereas processed meats add \$1.42 to non-farm economic activity. Highly processed products such as canned and frozen products generate over \$9.00 of business in the non-farm sector.

Purchases of agricultural commodities by consumers or for export have employment effects that differ by product, too. A million dollar sale of feedgrains into exports directly and indirectly requires 66 man-years of labor.

Employment requirements relate to the value added by the whole food and fiber system. In contrast to feedgrain exports, nearly eighty workers are required to provide one million dollars worth of processed meat products to consumers (table 11).

The importance of production agriculture for non-farm employment can be illustrated by the employment requirements associated with various final demands arising from a million dollars in farmgate sales. An increase in farm cash receipts of one million dollars to provide for feedgrain exports generates an extra 16 non-farm jobs. In contrast, a million dollar increase in farmgate receipts to provide for processed meat demand generates 59 non-farm jobs. Moreover, a million dollars of farmgate sales to provide for canned, frozen, and dehydrated food demand requires the services of 590 workers in the non-farm economy to process the product (table 11). Clearly, a change in the export composition of our exports from unprocessed feedgrains to more livestock products would substantially increase non-farm employment opportunities.

The value added by an activity in the economy, which is the same as income retained, is also indicative of the importance of a given flow of product from the farm. Processed meat products distribute \$.63 of the consumers' dollar into the nonfarm economy. For canned and frozen products, \$.89 of each dollar's sales is retained in the non-farm portion of the food and fiber system. The importance of production agriculture to a healthy economy is enhanced, the larger the non-farm share of total value (table 11).

#### Agricultural Exports and the General Economy

Agricultural exports are projected to reach \$47 billion in 1981. These exports will generate over \$94 billion of activity in the economy and will require the services of over 1.2 million full-time equivalent workers. If the composition of our exports does not vary drastically from 1979, sales by

those involved in production agriculture will increase by \$38 billion. Production agriculture will retain approximately 43 percent of the \$47 billion in exports, nearly \$20 billion. Production agriculture retains a larger portion of the value of agricultural exports than of the other more highly processed, domestically-consumed commodities. Exports are at least 66 percent grains and oils, products that have typically moved into export with a minimal amount of services added by the rest of the economy.

In 1979, the United States exported \$34.7 billion of products from the food and fiber system. Commodities exported directly from production agriculture totaled \$20.2 billion, comprised mostly of grains, oilseeds, and other unprocessed farm products. Another \$14.5 billion of agricultural exports came from the nonfarm economy--milled grain and oils, processed meats, and the like (table 16). Those exports from the food and fiber system generated \$71.3 billion of activity in the U.S. economy. For each dollar of agricultural exports in 1979, a little over \$2 of economic activity was generated. Twenty-nine billion dollars of business in production agriculture was stimulated by the \$34.7 billion in agricultural exports. Outflows from the domestic economy to purchase food and fiber imports amounted to \$16.7 billion.

The nonfarm economy contributed 59 percent, or \$41.9 billion in gross economic activity in 1979. Under 1972 employment conditions, this off-farm economic activity required 670,000 workers -- slightly less today as labor productivity has increased. Production agriculture retained \$14.5 billion; the nonfarm economy, \$19.5 billion -- a total retained income of \$34.0 billion (table 16).

If the United States were to increase the volume of its agricultural exports by 50 percent over 1979 levels, while retaining their composition, it would increase employment in the nonfarm economy by at least 300,000.

This could potentially reduce the unemployment rate by three-tenths of a percentage point -- for example, to 7 percent from 7.3 percent-- making a significant gain for the economy. Additional exports of this magnitude would also generate \$35.6 billion of economic activity in the economy. An additional \$7.2 billion of income would be retained in production agriculture -- a 12 percent increase.

Agricultural exports in 1979 employed approximately 1.2 million workers. Production agriculture required just over 600,000 workers, or eighteen percent of farm employment. The product of these people had an aggregate retained value of \$14.5 billion or \$23,000 per worker. In the nonfarm economy, the value added of \$19.5 billion amounted to nearly \$29,000 per worker in 1979.

Agriculture also benefits the economy through its positive trade balance. The agricultural sector provided a net balance of \$18 billion on the foreign exchange account in 1979--agricultural exports of \$34.7 billion and imports of \$16.7 billion (table 7). This agricultural trade surplus helped offset our nonagricultural trade deficit of around \$50 billion. Trends indicate that the agricultural trade surplus will continue at least into the near future. By reducing the trade deficit, U.S. agriculture provides strength to the American dollar, permitting necessary imports to be acquired at prices lower than would be the case with an undervalued dollar. Reducing the price of imports in dollar terms also assists in controlling inflation, as the demand for imports that do not have domestic substitutes is relatively unresponsive to price in the short-run; consumers are willing to pay the going price even when the import value increases substantially.

Summary

The agricultural sector plays a significant role in the economy of the United States. Through increases in productivity, agricultural output has increased more than 70 percent since 1950, while input use has increased less than 4 percent. This has enabled today's farmer to provide food and fiber for 60 domestic consumers plus meet the needs of an ever growing number of foreign customers. In contrast, one farmer provided for only 10 domestic consumers in 1929 and produced very little for export.

Substantial product flows occur between production agriculture and the rest of the food and fiber system. The value added to farm products as they flow through the economy amounts to 20 percent of GNP. In 1981, for example, the food and fiber system will generate nearly \$580 billion in GNP. Production agriculture retains 12.5 to 15 percent of the value added to agricultural products by the food and fiber system. In 1981, it will retain at least \$70 billion in GNP. Perhaps most importantly, the economic activity in the food and fiber system requires the services of 22 percent of the labor force--over 23 million people.

The export of agricultural products has an impact on the U.S. economy and on production agriculture, in particular. Production from nearly one-third of our harvested cropland is exported. Agricultural exports are expected to exceed \$47 billion in 1981, and will generate \$95 billion of economic activity in the U.S. economy. In 1979, agricultural exports required at least 1.2 million man years of labor. Further, each \$1 billion worth of exports provided for 35,000 jobs.

Besides providing for the basic necessities of life, the agricultural sector has contributed and continues to contribute significantly to the

prosperity of the U.S. economy. Because of the relationship that production agriculture has with the rest of the economy, changes in macro-economic conditions will impact on the agricultural sector and changes in the output required from production agriculture will, in turn impact on the strength of the nonfarm economy. These interrelationships must be recognized in public policy decision-making.

Table 1--Farm input expenses, 1979

Input	Amount
Feed	17,004
Livestock	12,684
Seed	3,400
Fertilizer & pesticides	9,749
Energy	7,920
Repair and operation	6,938
Custom and contract operations	4,078
Hired labor	8,327
Other	5,149
Interest	12,281
Taxes	3,943
Capital consumption	16,181
Net rent to landlords	<u>6,032</u>
Total	114,696

Source: United States Department of Agriculture, Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1979

Table 2--Harvested crop acreage, 1980

Crops	Acreage
--Million acres--	
Feedgrains	101.7
Foodgrains	74.8
Soybeans	67.9
Hay	59.4
Cotton	13.0
Peanuts	1.4
Field Seeds	1.5
Commercial vegetables	3.3
Fruits and nuts	3.5
Other	<u>14.4</u>
Total harvested acreage	340.9

Source: United States Department of Agriculture, Crop Production: 1980 Annual Summary

Table 3--Cash receipts from marketings of selected crops, 1981 (projected)

Crops	Cash receipts
--Million dollars--	
Corn	15,325
Soybeans	15,510
Wheat	9,903
Cotton	5,182
Tobacco	2,863
Sorghum	1,461
Rice	1,641
Commercial vegetables	7,370
Fruits and nuts	6,805
Other crops	<u>11,335</u>
All crops	77,935

Source: United States Department of Agriculture, Monthly Update Tables,  
(unpublished), 02/05/81

Table 4a--Livestock and livestock products, 1979

Product	Production	Value of production
	--Million pounds--	--Million dollars--
Cattle and calves	38,937	26,293
Sheep and lambs	712	418
Hogs	22,617	9,444
Chickens	16,710	4,194
Turkeys	2,959	1,215
Milk	123,623	14,968
Wool	103	89
	--millions--	
Eggs	69,227	3,355

Source: United States Department of Agriculture, Agricultural Statistics, 1980

Table 4b--Cash receipts from marketings of livestock and livestock products, 1981 (projected)

Product	Cash receipts
	--Million dollars--
Cattle & calves	36,552
Hogs	11,660
Chickens	5,222
Turkeys	1,366
Milk	18,263
Eggs	3,290
Other	<u>2,409</u>
All livestock	78,762

Source: United States Department of Agriculture, Monthly Update Tables, (unpublished), 02/05/81

Table 5--Farm value, consumer expenditures, and marketing bill for domestic foods, 1979

Item	Farm value	Marketing bill	Consumer expenditures	Marketing bill as a percent of consumer expenditures
-----Million dollars-----				
All farm foods	80,595	164,484	245,079*	67
Beef	22,722	22,935	45,657	50
Pork	8,200	16,454	24,654	67
Other red meat	923	779	1,702	46
Poultry	5,394	7,266	12,660	57
Eggs	2,642	2,555	5,197	49
Fluid milk & cream	7,136	7,227	14,363	50
Other dairy	7,607	11,620	19,227	60
Fresh fruits	2,217	7,634	9,851	81
Fresh vegetables	3,764	9,759	13,528	59
Processed fruit	2,175	5,052	7,227	70
Processed vegetables	2,671	17,833	20,504	87
Grain mill products	1,769	6,130	7,899	78
Bakery products	3,862	23,431	27,293	86
Fats & oils	3,731	6,622	10,353	64
Other foods	5,782	19,187	24,969	77

\* Consumer expenditures on food and beverage totaled \$315 billion in 1979. The \$245.1 billion expenditure is on domestically produced food. It does not account for expenditures on imports and certain beverages.

Source: United States Department of Agriculture, Agricultural Outlook, December 1980

Table 6--Components of consumer expenditures for domestic foods, 1979

Components	:	Expenditures
	:	
	:	
		--Billion dollars--
Consumer expenditures		245.1
Farm value		80.6
Marketing bill		164.5
Labor		73.7
Packaging materials		18.5
Transportation		12.2
Profits before taxes		10.1
Fuel and energy		7.2
Other		42.8

Source: United States Department of Agriculture

Table 7--United States agricultural trade, 1979

Item	:	Value
--Billion dollars--		
Total agricultural exports		34.7
Feedgrains		7.7
Food grains		6.3
Oilseeds and products		8.9
Cotton		2.2
Tobacco		1.2
Animals and products		3.8
Fruits, nuts and vegetables		2.5
Other		1.8
Total agricultural imports		16.7
Crops, fruits and vegetables		1.7
Animals and products		3.9
Coffee		4.2
Cocoa products		1.2
Sugar products		1.2
Wine and beer		1.0
Other		3.5

Source: United States Department of Agriculture

Table 8--United States grain and oilseed exports: share of domestic production and of world trade, 1979/80

Commodity	Exports as a share of domestic production	Exports as a share of world trade
Wheat	64	40
Feedgrains	30	66
Soybeans	39	84

Source: United States Department of Agriculture

Table 9--Per capita food consumption, retail-weight equivalents,  
by major food groups, 1979

Food groups	Per capita consumption
--pounds--	
Meat	159.5
Poultry	59.0
Fish	17.6
Eggs	35.9
Dairy products	345.0
Fats and oils	56.6
Fruits	139.3
Melons	23.5
Vegetables	209.3
Potatoes	81.8
Beans, peas, nuts and soya products	18.4
Flour and cereal products	150.0
Sugars and sweeteners	137.0
Coffee, tea, cocoa	11.9
Total all foods	1,463.0
Animal products	624.0
Crop products	839.0

Source: United States Department of Agriculture, Agricultural Statistics, 1980

Table 10--The food and fiber system and the domestic economy, 1978

Food and fiber system activity	Employment	Value added by activity	Total economic impact of activity generated
	--Millions--	--Billion dollars--percent--	--Billion dollars--
Production Agriculture	3.4	59.2 : 14	156
Non-farm	19.0	373.5 : 86	765
Food processing	1.7	51.1 : 12	185
Resources and services	2.3	76.7 : 18	203
Manufacturing	4.7	83.1 : 19	127
Transportation, trade and retailing	7.2	136.5 : 30	179
Eating establishments	3.1	30.1 : 7	70
Total food and fiber system	22.4	432.7 <sup>1/</sup> : 100	921 <sup>1/</sup>
Total domestic economy	100.4 <sup>2/</sup>	2,156.1 : n.a.	n.a.
Food and fiber system as a percent of the U.S. economy	22.3	20.0 : n.a.	n.a.

<sup>1/</sup> Results in a gross business multiplier of \$2.13 per dollar of consumer purchases and exports.

<sup>2/</sup> Represents the available work force

Table 11--Economic and employment effects in the food and fiber system of consumer expenditures on selected agricultural products, 1972

Product	--Dollars--			--Dollars--		
	Production	Output generated per dollar or	Non-farm activity per dollar of farm sales	Employment generated by a final demand	Non-farm employment per million dollars of farm sales	Value added by each activity per dollar of sales
Feedgrain	Production: agriculture: Non-farm: Total	1.12 .78 1.90	.70	43.4 22.4 65.8	15.7 47.7	.56 .44 1.00
Poultry and eggs	Production: agriculture: Non-farm: Total	1.37 1.56 2.93	1.14	64.6 41.8 106.4	31 .69	1.00
Processed meats	Production: agriculture: Non-farm: Total	1.44 2.05 3.49	1.42	37.3 41.4 78.7	37 .63	1.00
Canned, frozen and dehydrated products	Production: agriculture: Non-farm: Total	.23 2.19 2.42	9.52	16.3 62.2 78.5	11 .89	1.00

1/ Non-farm output multiplier divided by farm output multiplier.

2/ Under 1972 employment conditions.

3/ Calculated by multiplying non-farm activity per dollar farm sales by non-farm employment for a million dollars of final demand.

Table 12--Impact on the food and fiber system of consumer expenditures on feedgrains, 1972

Activities	--Dollars--			--Percent--			--Dollars--		
	Output generated per dollar of feedgrain expenditure	Employment generated per million dollars of expenditures	Value added by each activity per dollar of consumer expenditure	-Number-	-Percent-	-Percent-	-Number-	-Percent-	-Percent-
Production agriculture	1.12	59	43.4	43.4	66	66	66	66	66
Livestock	.07	4	2.6	2.6	4	4	4	4	4
Crops	1.05	55	40.8	40.8	62	62	62	62	62
Non-farm	.78	41	22.4	22.4	34	34	34	34	34
Food processing	.02	1	.2	.2	--	--	--	--	--
Resources	.14	7	2.0	2.0	3	3	3	3	3
Manufacturing	.19	10	5.4	5.4	8	8	8	8	8
Transportation-Retail	.10	5	6.7	6.7	10	10	10	10	10
Services	.33	17	8.1	8.1	12	12	12	12	12
Total	1.90	100	65.8	65.8	100	100	100	100	100

Table 13--Impact on the food and fiber system of consumer expenditures on poultry and eggs, 1972

Activities	Output generated per dollar of expenditure on poultry and eggs	Employment generated per million dollars of expenditures	Value added by each activity per dollar of consumer expenditures	
			-Dollars-	-Percent-
Production agriculture	1.37	47	64.6	61
Livestock	1.04	36	51.7	49
Crops	.33	11	12.9	12
Non-farm	1.56	53	41.8	39
Food processing	.59	20	5.8	17
Resources	.07	2	1.0	1
Manufacturing	.26	9	7.1	7
Transportation-Retail	.19	7	13.1	12
Services	.45	15	14.7	14
Total	2.93	100	106.4	100
				1.00

Table 14--Impact on the food and fiber sector of consumer expenditures on processed meats, 1972

Activities	Value added by each activity per dollar of consumer expenditures		
	Output generated per dollar of expenditure on processed meats	Employment generated per million dollars of expenditures	Percent
--Dollars--			
Farm	1.44	41	37.3
Livestock	1.12	32	25.0
Crops	.32	9	12.3
Non-farm	2.05	59	41.4
Food processing	1.31	37	13.9
Resources	.07	2	.9
Manufacturing	.20	6	5.5
Transportation-Retail	.17	5	12.1
Services	.31	9	9.1
Total	3.49	100	78.7
--Dollars--			
			100
			1.00

Table 15--Impact on the food and fiber sector of consumer expenditures on canned, frozen and dehydrated food products, 1972

Activities	Output generated per dollar of expenditure on canned, frozen and dehydrated food products			Employment generated per million dollars of expenditures			Value added by each activity per dollar of consumer expenditure
	-Dollars-	-Percent-	-Number-	-Percent-	-Number-	-Dollars--	
Production agriculture							
Livestock	.06	23	9	16.3	21		.11
Crops	.17	0	3	1.8	2		.01
Non-farm	2.19	0	6	14.5	19		.10
Food processing							
Resources	1.18	0	91	62.2	79		.89
Manufacturing	.06	0	49	26.2	33		.35
Transportation-Retail	.47	0	2	.9	1		.03
Services	.22	0	19	12.8	16		.20
Total	.26	0	9	13.8	18		.15
	2.42	0	11	8.5	11		.16
			100	78.5	100		1.00

Table 16--Impact on the food and fiber system of agricultural exports, 1979

Activities	-Billion dollars-	-Percent--	Output generated by the agricultural exports	Value added by each activity	Employment generated
Production agriculture	20.2	58	29.4	41	14.5
Non-farm	14.5	42	41.9	59	19.5
Total	<u>34.7</u>	<u>100</u>	<u>71.3</u>	<u>100</u>	<u>34.0</u>

1/ Results in a gross business multiplier due to exports of \$2.05 per dollar of exports.

2/ Exports and income retained differ due to complementary imports.

3/ Under 1972 employment conditions.



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